

Final WG 9, 6/14/05

**National Aquatic Animal Health Plan – Meeting Report
Crustacean Pathogen/Disease Program Standards
Tucson, AZ
May 5-6, 2005**

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Welcome and introductions by participants. Power point presentation and overview of the national aquatic animal health plan (NAAHP).

Approval of Agenda

ISA Program: Description of this program can be found on the APHIS web site under the salmonid working group minutes. Infectious Salmon Anemia (ISA) program synopsis was given by Steve Ellis. An overview of the Spring Viremia of Carp (SVC) program was presented by Jill Rolland.

Indemnity has been at the 50% level with the expectation from the Federal Office of Management and Budget that States would act as partners and provide the other 50% for costs related to depopulation, cleaning and disinfecting and indemnity for animals. There is a group at Mississippi State looking at private crop insurance.

What is the incentive for farmers? If there is a voluntary program, you can be eligible for indemnity from a Federal program. A federal program can also assist in identifying gaps in biosecurity programs designed to keep pathogens out of facilities. Regardless of whether or not a Federal program exists, States can quarantine facilities when a foreign animal disease or OIE list disease is diagnosed. The result is that facilities can go out of business while under quarantine, particularly if they are not part of a program that can provide funding to assist with depopulation, cleaning and disinfection.

We could also have a component of the plan to evaluate the biosecurity methods a farm puts in place, to ensure they are adequate.

The very question of value of being involved in such a plan has been addressed in the ISA program by conducting epidemiologic studies which have been able to show how rapid detection and removal of cages has reduced likelihood of neighboring cages becoming infected and thereby saving money by keeping these fish in production until harvest.

US marine shrimp farming industry has continued to grow partially due to biosecurity measures recommended by the shrimp farming program.

Review of crustacean disease list:

Reportable aquatic animal disease list (RAAD) – includes OIE diseases that the U.S. is obligated to report. Program aquatic animal disease list (PAAD) – a list of U.S. reportable diseases for which we would want some type of Federal program for.

Suggestion was made to look at the U.S. marine shrimp farming program list, which is larger and more dynamic than the OIE list. The list was developed for broodstock production.

The importance was stressed that the diseases are of national significance. What is the set of criteria for including the diseases? They meet the serious economic impact criteria and they are excludable from breeding programs. Whether they all require a program or are reportable is another issue. Would this list be different for a commercial producer vs. a seed producer? Yes, this would be likely.

Is there a commercial broodstock industry or is it vertically integrated? Yes, primarily a broodstock industry. In Texas, there is presently one operating shrimp hatchery.

Is there a need for standards for the hatchery production industry and a separate set of standards for the broodstock industry?

There is some interest in broodstock industry to have a very stringent disease list due to export issues. There are approximately 10-11 broodstock facilities across the U.S. All are part of a surveillance program. Broodstock is exported as well. There is an issue of forged certificates for broodstock. This is a problem with other industries too.

Is there consistency with the countries we trade with? Only some States may require certificates. Network of Aquaculture Centers for Asia (NACA) and Australia have pathogen lists for shrimp. Nobody is importing seed or broodstock from outside of the U.S. There are some people trying to develop broodstock from imported stocks (involving quarantine, etc.), but not for sale and distribution.

In Texas, *L. vannamei* broodstock (& their progeny) are regarded as “high health” or “Specific Pathogen Free (SPF)-derived” and are considered one step below the SPF rating. Monthly health checks (diagnostic testing) are conducted at the hatchery to ensure their health status. Texas Parks and Wildlife regulates the importation of live shrimp for

mariculture purposes. Import of live *L. vannamei* postlarvae from foreign sources for grow-out purposes must meet strict criteria, which has presently limited the importation of seedstock to only domestic sources. Commodity and bait shrimp product from various sources is imported and processed in Texas. Seed was once imported from Mexico to the U.S., but was problematic.

There is one farm in Arizona that has a hatchery in Aruba. They meet the State requirements to stock seed in Arizona. This is one exception and it works because there have been no significant disease problems in Venezuela. The hatchery located in Venezuela had an outbreak of a significant disease this year and therefore may affect the ability for that farm to bring in seed from the hatchery in Aruba next year.

If farms are getting exposure to these diseases, there is no reason to have programs for them - from a standpoint of a plan and what diseases are important. The diseases listed as C1 (in the U.S. marine shrimp farming program list) are the first ones to look at. These would very likely ruin the industry if found at a growout facility.

In the last ten years, the industry has changed. Risk from post-larvae use of seawater and wild broodstock has gone away. Domesticated brood stock, biosecurity measures, etc. are now in place because industry would be severely impacted by white spot that could come through with wild animals and use of untreated seawater.

Brazil closed their borders due to shrimp imports. Infectious myonecrosis (IMN), proposed to be added to OIE list, will only come out of Brazil via frozen product as no one is importing their seed due to poor stock quality.

Texas, Arizona and South Carolina have disease lists for shrimp. Imported post-larvae are not cost-effective in South Carolina due to quarantine and biosecurity measures imposed upon them.

Taura – known to be extremely important. Taura could devastate the industry and the impact on wild animals is unknown. Penaeids are the only susceptible species.

Yellowhead – found in imported monodon (frozen commodity). It is a serious threat to our penaeid industry, and has not been found in the Americas at this time.

White spot – bad news in penaeid shrimp. White spot has a wide host range including both farming and wild crustacean implications (can infect endangered wild crayfish).

Tetrahedral baculovirus – should be excluded from breeding programs. It is native and found in wild shrimp, particularly in gulf coast and south east Atlantic ocean. May or may not be necessary for a national list. It is easily managed when present as its impact can be minimized.

Crayfish plague (*Aphanomyces astaci*) is native. Also is native in red claw crawfish and could affect the Australian red claw crawfish industry. This industry has a lot of growth

potential. Both Kentucky State University and Auburn University are looking into this species. With candidate species for new development, it could be important. It is enzootic in California and Louisiana and common in wild crayfish populations. It could be more of a local issue or have potential for regional concern. Keep on reportable disease list. May be important for developing industries later on, and should not be forgotten.

Spherical baculovirus (MBV) - not found in the U.S. and species raised in the U.S. are not very susceptible (species in the Americas). It could be important for monodon in Hawaii. MBV is not known to infect blue shrimp (*Litopenaeus stylirostris*), nor is there evidence that MBV can infect and replicate in any other Western Hemisphere penaeid species.

IHHNV (Infectious hypodermal and hematopoietic necrosis virus) - Broodstock and grow-out problem. IHHNV has potential for great impact on broodstock industry and can cause very significant on-farm production problems. The effect in production stocks is not so much reduced survival, but reduced average growth rates and hence smaller average size at harvest. The name of the disease it causes is RDS for "Runt-Deformity Syndrome". This disease has caused millions of dollars in lost production in the Americas and is very likely causing similar problems in regions of Asia that are now growing *L. vannamei*.

NHP (Necrotizing hepatopancreas disease) - Is endemic only in Texas and is presently not a problem in other U.S. shrimp producing areas. This is a rickettsial disease that is being added to the OIE list, since it is a problem in other countries. It is presently controlled in Texas with oxytetracycline-medicated feeds under an INAD. The pathogen is believed to be present in wild reservoirs in the shrimp pond environment. It is primarily a grow-out problem, but it can be moved with broodstock.

There is more interest in protecting the broodstock programs. That is where the greatest investment has been in the domestic industry.

Taura (TSV) is an important enough pathogen that the shrimp farming program would want to keep it out, even if eradication of asymptomatic animals was necessary to keep it out. However, this is not necessarily the best option, especially in regions where the potential sources of TSV contamination are not readily excludable with reasonable biosecurity methods. An example is south Texas farms that are located near large concentrations of reprocessing plants.

The US marine shrimp farming program is already doing a lot to keep these diseases out of industry already.

Stocks that are going into areas that may have disease, still need to be SPF and resistant. Stocks need to be clean to start out with, at least in the penaeid species.

Processing plants are probably a large source of the diseases that are affecting industry.

Unrestricted import of product is an issue for the shrimp farming industry.

Eradication scenarios: White Spot, Taura and possibly Yellowhead. These are the three worst diseases. Possibly IHNV based on what it could do to breeding programs. (More support was given for IHNV to be included in this list of worst diseases in comments after the workshop).

Which of these pathogens are exotic to North America? They may be permanently in the wild, but all could be considered exotic. However, may also be considered established. All of these, except yellowhead, have been reported in the U.S., but are not in the farmed population. All of these are likely to be found in commodity shrimp (imported product for human consumption or bait).

Macrobrachium shrimp in South Carolina are required to have the same testing as penaeids.

Is there data showing whether or not macrobrachium, crawfish, or artemia are carriers?

What will the definition of farm-raised be? For crawfish, the vast majority are collected from the wild. It may have to be defined by species.

There is interstate commerce of live crawfish.

Texas is looking into developing farm-raised bait shrimp. Aztecus and possibly duorarum are the primary species of interest.

Texas has detected viable WSSV in imported, wild-caught, frozen bait shrimp from China. The sale of infected imported shrimp for bait purposes in the U.S. is an issue that needs to be addressed.

How much infected product is coming in and being dispersed-dose effect?

80% of shrimp is imported and of the remaining 20%, it is mostly wild-caught.

Most of the processing plants for shrimp are on the coast. Treatment and disposal/discharge of water effluents and solid wastes are concerns for U.S. natural shrimp fisheries and shrimp farms. This is the main risk with imported shrimp; more so than product destined for human consumption.

Action item: Jill will send out Canadian risk assessment on white spot to the group.

Has it been definitively proven that birds can transmit disease? Yes-through feces or from regurgitation.

No formal risk assessment has looked at the potential pathways from imported shrimp. This could be something worth looking at.

White tail disease (nodavirus) of macrobrachium - OIE considered the disease, but it was withdrawn due to lack of robust diagnostic methods. This is a disease we need to watch. Are there other people we could contact for crayfish or macrobrachium? Ron Thune is a good contact for crayfish.

Zonation:

Zonation can consist of an individual farm to country-wide. Goal for US is to be white spot free, but this may not be possible if it is present in the wild. If white spot is found in the wild, it would be included in the OIE annual report since it is already found in the US. The US may not be considered free, but could be certified as free by facility. OIE reporting takes place both by emergency reporting or end of year reporting. A facility or zone would have to take steps for eradication to be declared free. Once free, new finding is an emergency report. Trading countries treat findings differently depending on country and disease.

It is important for post larvae, interstate movement, to keep infected imports from coming in. Are wild harvesters concerned? Agencies are concerned within States of wild exposure. Imports are still sold in stores though infected for economic reasons, since there is not enough supply to meet the demands through other sources. Also, there are not many examples in history of disease due to imports. IHHN caused fishery collapse in Gulf of California is one example. Dead blue shrimp were found in trawl nets. The *L. stylirostris* strain in the Gulf of California now is more resistant, but still does not do well in farmed populations. Cause and effect is hard to prove from farm to wild. The environment also can change to cause infections to become clinical. National monitoring and fish kill investigations can be helpful.

Many of these diseases are in the wild already, but can zone facilities as free. Biosecurity program can address transfer of disease potentials. In HI, growth will be in broodstock worldwide as demands for SPF animals from HI increase. For areas around facilities, how large can they be zoned? As large as freedom can be proven as it will then be easier and cheaper to demonstrate continued freedom. Start with all broodstock facilities zoned free and keep frozen imported product (shrimp shacks) out of these zones. Would want them to buy shrimp locally, but could cause trade problems. Competent authority may not be able to call a zone free if imported shrimp able to be sold. Would like to not have to enforce, but convince local shops to purchase locally. Since HI is small, it is easier to talk individually to sellers, conduct surveys, etc. HI imports so much shrimp, that the whole island can not be supplied with locally grown product, and it can not all be called free. But HI can start with zones around SPF facilities. May want to have labels at packing facilities to designate certified free product. Or list of safe or low risk products such as cooked, or peeled and deveined shrimp. Frozen and fresh shrimp would be highest risk. Potentially may be able to bring in cooked imported shrimp into free zones. Small zones may be best way to start, may be model for other countries in future.

If there was a desire to harvest wild shrimp and export, would have to label with unknown health status, not allowed in SPF zone. There is a big push for wild American shrimp label. Would not expect other countries to accept wild caught, but not much is exported - small amount. Some product is exported for processing and then imported back into the US. Potential for changes in future also need to be considered. Moving to closed facilities rather than majority of open ponds as is the case now. National Poultry Improvement Program (NPIP), a poultry breeder program, may be similar to what is needed here. There are vertically transmitted, specific diseases targeted in the NPIP, but the list can be added to - it is changeable. The program was developed to show that the poultry were free from certain specific diseases.

Processing plants can find positives for shrimp sent to other areas. How is this reported? Only report if it affects our own product, if in the US. Coming from a foreign country to US for processing then sent back out to another country. Need risk assessments to determine threat. Processors may be only repackaging here or just storing. What is percentage of US product is exported of all aquaculture? About 5% at the maximum.

Some US companies have hotel chains in Mexico or other countries and may want to use US product. Some labs are testing product to be exported to Mexico or other countries.

Open water situations may be too difficult to zone, except for filtration to 100 microns in carrier stage "bite size" for shrimp. But the area could not be called SPF free unless it was tested under all required. Would want quarantine in addition to testing. Ponds and tanks open are the most common methods to raise shrimp. Have to determine logical barriers to call an area a zone and ability to test to show is free.

Surveillance:

What testing is necessary? Numbers of samples? Frequency?

During the past 3 years, Texas has tested at the 5% prevalence level for health surveillance of healthy-appearing shrimp populations (e.g. hatcheries). The Texas Veterinary Medical Diagnostic Lab testing protocols and methodologies will need to be revised if the U.S. adopts a policy of 2% prevalence testing, as recommended by OIE. ISA is tested monthly, by selection of cages, and targeted by mortality, moribund, history, etc. In the OIE manual, a new chapter on testing and surveillance takes into account the sensitivity of the test itself. Costs of increased testing are prohibitive. Charts we use now use 100% sensitivity as taken for granted. But targeted sampling over time needs to be factored in also. OIE may need to specify test used, etc.

In normal healthy populations with no obvious signs of disease, what prevalence is necessary for testing? For the big 4 diseases, white spot kills all hosts, and remains in populations in very low levels. IHHN, yellowhead, and Taura will remain at high prevalences. Have greater ability to find in smaller sample sizes. White spot would be the problem. Knowing appropriate samples to take, QA/QC will be important. Sampling

over time needs also to be taken into account. If pond has been positive, will have higher prevalence. White spot can be missed in post-larvae, need to also test broodstock.

Testing could focus on the specific purpose of demonstrating freedom for SPF stocks, except for diagnostic cases when mortality is seen. Surveillance is conducted during grow out in Texas at least twice a year by personnel from the Department of Wildlife and Fisheries (TPWD), unless a farmer sees a problem with a pond (e.g. bird activity or mortality). Required testing by the state is conducted primarily for protection of wild shrimp stocks more so than to protect farmed shrimp populations. Production ponds are checked at stocking and at harvest in Texas with the expectation of the farmer conducting daily pond-side exams. Weekly and monthly farm reports are sent into TPWD by each farm. TPWD is contacted if anything is seen as suspicious by the farmer and samples are sometimes sent to the diagnostic lab for evaluation. Site visits by trained TPWD personnel do not always result in sample submission for diagnostic testing. State employees are trained in what clinical disease signs to look for.

Costs of surveillance in Texas are absorbed by the industry. Most is visual surveillance. At site visits, a select group of 5-10 affected shrimp may be collected from a pond, in which problems are seen, for diagnostic evaluation. Larger sample sizes are collected for broodstock testing. In the ISA program, APHIS pays for the surveillance. It is a problem in Hawaii to pay for the costs of testing. Hawaii does pay for it until funds are gone, then they are no longer able to test. Producers are not obligated to pay for testing in Hawaii. OIE term is pathogen free zone, not SPF zones. Possible problem in terminology? But very commonly used with shrimp. SPF needs to be defined.

It is very important that SPF be defined as currently it is whatever is desired at the time, as it shows the shrimp to be free of certain specific pathogens. The SPF list is inconsistent from country to country and sometimes State to State. There needs to be a National standard where the terms SPF and High Health are consistent across the country.

OIE requirements for a free zone or compartment criteria listed include biosecurity, history of freedom for a minimum of 10 years, despite conditions conducive to disease emergence. Two years targeted surveillance for reestablishment or new establishment of a free zone or compartment. Information about best types of samples and eventually the best diagnostic tests, will be in the new OIE manual.

Other countries' surveillance programs? Shrimp are high value animals; disease control measures improving rapidly. Some are tested weekly by PCR. At first sign of mortality may destroy or harvest depending on life stage. Or let fish eat the moribund or dead shrimp, to allow other shrimp left to live, to manage around white spot.

Most marine shrimp raised in Hawaii are in open ponds except SPF ones (Oceanic Institute). Under 1 million pounds are produced in Hawaii. 25% is sold as broodstock from US, most from Hawaii, some in Florida. Called high health in Texas instead of SPF.

Possibly share surveillance to cut down on costs such as brucellosis, TB where costs are paid by USDA, States do testing in the field, and partnerships are formed. Often USDA pays costs when it is a program disease, and a State lab is usually used. This would help with consistency between States in surveillance that is conducted. Have to have line item funding, easier if there are human health implications in order to gain support for funding. Also need answers for industry on what will happen if these diseases are found during surveillance. Industry may not be willing to participate in a program if surveillance is not paid for. May not need surveillance if not moving live across borders unless for State monitoring processes. May need to look at affects of effluents and affects to wild shrimp. Depends on the disease, situation, and if it is in the wild already. With shrimp, pathogens could be in wild stocks in very low levels, and much higher levels in effluents. May need to rely on State or Federal natural resource agencies to determine risks, address issues, etc. It is very difficult to show cause and effect from farm to wild. Need proper risk assessments. Terrestrial agriculture is also getting more scrutiny over environment, dust and odor emissions, pathogen discharge, etc.

Encouragement was given for State and Federal governments to pay for surveillance due to cost burden on industry.

State of Montana requires inspections – State covers expense of collecting samples and Fish and Wildlife Service conducts the testing. Essentially there is no cost or a low cost to the industry.

Disease Prevention Measures:

State by State regulations differ for live shrimp coming into the U.S.

There is an issue regarding entry of dead shrimp being submitted for diagnostic testing purposes. FDA has been stopping many samples from entering the U.S. USDA, FWS, FDA and Customs and Border Protection (CBP) have all stopped shipments at various times. USDA has training for port veterinarians. Such training needs to be given to other agencies to ensure diagnostic samples get through. Whatever it takes to get a consistent approach would be helpful.

Minor import of live animals into U.S. due to problems incurred with the animals that were imported for brood stock.

Tracking of permits needed to avoid fraud.

Auditing of foreign competent authorities can be done to evaluate competency.

Ornamental crustaceans – are they a concern as a potential vector? We've already heard that product may be an issue. We know nothing about diseases of those types of animals. We may need to start by investigating problems with imported ornamentals. It would have to be cooperative with the importer.

New genetic material is being brought in for the development of new genetic lines. They typically go into quarantine upon arrival for thorough testing. Even if tested prior to arrival, they still go into quarantine.

Hawaii asks for pre-screening for Taura, White Spot, IHHN and Yellowhead. The animals would then go into quarantine.

South Carolina has a minimum of a 25 day quarantine, cannot discharge water for 30 days from ponds after the quarantine and have to test for diseases.

Individual farmers have separate facilities where they quarantine in South Carolina.

In Hawaii there is a State quarantine facility with tanks, and a 120 day quarantine is required with intensive testing.

Where does the effluent water go? Should probably be specified.

South Carolina quarantine is for both brood stock and post-larvae.

The imported animals should not go into production. They should go into quarantine and the offspring would/could be used for production. This would be the ideal situation. This is the International Council for Exploration of the Seas (ICES) model.

There are also some models for salmon and trout imports.

Page 5 of the US Marine Shrimp Farming Consortium newsletter outlines SPF stock development including quarantine.

Primary quarantine is conducted at Don Lightner's or Jeff Lotz's labs. Secondary quarantine is done at the Oceanic Institute.

Movement of animals from Arizona to Hawaii does require a permit that's good for a year. No specific testing requirements. There is a list from the aquaculture program – but it's not regulatory.

Less than 100 shrimp are tested from primary quarantine. The animals are held individually or in small groups (unless they are from the same spawns) to ensure they do not infect the whole group if they are diseased or carrying a pathogen. Non lethal testing is done for all shrimp. With lethal testing of samples from test populations or subpopulations, it is necessary to cull any populations or subpopulations which test positive because individual sampling is not carried out.

Action Item: Tony will send to the group the protocol for testing for the SPF shrimp program. This work is all paid for out of the Marine Shrimp Farming Consortium (CSREES line-item funding).

Arizona requires a permit from the State Veterinarian for live shrimp imports. The list of pathogens does work. No bad experiences in Arizona yet. However, there are only six years of history and four farms in Arizona.

Texas regulations are overseen by Texas Parks and Wildlife. For imports of shrimp for production, there has to be a two year history of testing negative for OIE notifiable shrimp pathogens and shrimp must be of SPF origin. Biggest risk perceived to be monodon imports from foreign countries.

It would be helpful to have more prescriptive regulations for import of live exotic shrimp species. Basic guidelines could be useful.

Some SPF monodon lines have been developed in the U.S. and outside of the U.S. There will probably be more programs in Hawaii and Florida.

There is interest for broodstock programs in U.S. territories: Guam, Marshall Islands – haven't developed to date. Saltonstall-Kennedy (S&K) grant to develop an SPF monodon program in Guam.

END DAY 1

Recap of discussions from day one.

The U.S. Marine Shrimp Farming Program has a protocol for bringing in new animals. It could be helpful if there were controls put in place for importations in general – example monodon's brought into Florida.

Sooner rather than later we should have health requirements for crustaceans coming into the U.S. for breeding or growing purposes. The ICES model is a good one.

There is the potential for post larvae to come in for grow-out purposes, and currently the only requirements would be State requirements.

Currently health determinations for imported shrimp are mostly made by Don Lightner and Jeff Lotz.

Members of the U.S. Marine Shrimp Farming Program work with the State regulators for importation of animals.

Historical data on health status or other health records coupled with quarantine is another model for bringing in new animals. It is an opportunity to have one more check before the animals are released for grow-out.

For Florida, shrimp aquaculture is relatively new. It's possible the regulators didn't know what requirements to list for the monodon that entered the State.

Are there State regulations impeding the movement of safe product? There are some State laws that restrict culture of certain shrimp species that are considered potentially safe to grow. In Texas, interstate movement of wild indigenous bait shrimp species has occurred and is not regulated.

South Carolina's regulations are only for non-native shrimp, as are Texas' regulations.

Keep in mind the existence of the brine shrimp industry (California and Utah are the States with largest production) and other crustacean industries.

Artemia are shipped either dehydrated (cysts) or sometimes as adult frozen blocks.

Disease issues with artemia are not well known – it is known that there are diseases, but there is very little information about the diseases.

Lobsters and crabs are also being shipped and the government is asked to certify their health.

Are live crayfish being sent to Japan?

Red claw crayfish are brought in from Australia. These are not inspected prior to entering Kentucky. The hope would be to grow their own in Kentucky. No health checks are required at this time.

Blood worms are used to feed shrimp. In Maine, these are tested by PCR for white spot. Nick Brown is leading the project.

Disease Management:

Action Item: Biosecurity protocols exist for each facility that belongs to the U.S. Marine Shrimp Farming Consortium (Consortium). Tony will provide these protocols to the group. The protocols primarily cover diseases and escapes. A manual for shrimp was made for the Consortium on disinfection. This is the disinfection part of the OIE manual (chapter 1.1.5, section C) for crustaceans. Farms are good at following these disinfection protocols. The shrimp clean-up manual is essentially identical to the OIE chapter. There is both routine sanitation practices and facility clean-up following an incident.

Is biosecurity on shrimp farms the standard, or is there a wide variety?

The Texas, the document (Shrimp Farm Inspection Program; Standard Operation Procedures used by Coastal Fisheries Division) does not go into detail about how to respond to a disease outbreak.

Use of antibiotics or antimicrobials in shrimp: None are approved for use in the U.S. There is use through INADs. The INAD is obtained directly through FDA. Not a high need for antimicrobials in the shrimp industry.

Main feed companies are Rangen, Burris and Zeigler.

Most US farms are shut down part of the year and are cleaned at some point. This does not occur in some of the tropical shrimp farming areas. All farms are shut down at the same time. The situation is different in Hawaii, US territories, and possibly in south Florida.

Is there a need for access to more chemotherapeutants? There is an urgent need for access and FDA approval of more chemotherapeutants for shrimp aquaculture.

Sentinel animals are kept with brood animals to gauge the health of the brood. Sentinels are used to test for the big four and also for other diseases by histology.

Disease Mitigation: how is the decision made to depopulate a pond or manage a disease? In Texas, the facility is first quarantined. All affected ponds are patrolled daily and dead shrimp are collected and buried at least two feet deep. The dead shrimp are collected to avoid bird activity/predation. If Taura (TSV) is detected in a pond, the pond water can not be released until after September 1 – this practice is based on the assumption that the wild shrimp species have migrated away from the coastal waters. However, there may still be a reservoir present.

Is there monitoring of clean-up in Texas? Yes-Texas Parks & Wildlife is the regulatory agency.

When the big four occur – depopulation is voluntary in Hawaii, but they do it. In Texas depopulation is recommended. After the 2004 TSV outbreak in Texas, there is concern that TSV may over-winter and persist in the shrimp pond environment via a reservoir host. Farms will be stocking with TSV-resistant strains in 2005 and checking for possible recurrence of TSV.

The TSV non-resistant shrimp strains (bred for quick growth) were the first to show clinical signs of TSV infection in the 2004 outbreak in Texas. The shrimp were close enough to market size, that the survivors were able to go to market. Economic losses were minimal since all the depopulated ponds that had been stocked with the fast-growth shrimp lines were restocked with TSV-resistant strains.

The industry is trying to manage around disease occurrences, even if infected with the big four. However, water cannot be discharged (in South Carolina – the water would be discharged to an empty pond). In Texas, the discharge of infected waters varies with the pathogen and is initially restricted to empty ponds on the farm for depopulation purposes. TSV-infected pond waters can not be discharged until post September 1.

Reduced water exchange has become a primary biosecurity measure adopted in Texas to reduce the possibility of virus introduction via the water. After initial pond stocking, the waters can not be exchanged for 6-8 weeks with water inflow restricted to replacement of waters lost to evaporation. As a result of this practice, deterioration of pond water conditions and an increased prevalence in secondary bacterial infections have become health issues.

South Carolina has regulations regarding storm water, hurricanes, etc. and shrimp farms.

In Hawaii, when white spot came (there are no white spot resistant strains), the company had its own plan for depopulation, cleaning and disinfection. Hawaii does not have regulations regarding how to deal with an outbreak – including quarantine.

With white spot in Hawaii, some shrimp went to market locally. This was not seen as a threat as imported WSSV infected shrimp are currently being sold in the local market.

With Taura, the shrimp would not be eradicated. With white spot, there is a temperature trigger. An early harvest could be planned before the disease actually breaks. Neighboring farms would want to be protected because bird activity can present a threat to your neighbors.

If shrimp were in ponds year round, a different view might be held. In areas where ponds are shut down and cleaned and disinfected every year, the opportunity exists to break the cycle.

South Carolina – everyone drains, dries and then limes (due to acid soil). The liming also acts as a disinfectant.

Disease management strategy is mostly exclusion and prevention.

Questions about reservoirs could be answered with appropriate research funding.

We need more extension services to industry as a management strategy.

Many white spot introductions have happened due to feeding of frozen crustaceans from white spot positive countries to naïve animals.

It could be interesting to sample near processing plants and near farm outlets to do a risk analysis. Processing plants probably not interested as this is a bigger industry than just the shrimp industry.

Emergency/Contingency Planning:

For South Carolina, on-file emergency contingency plans are required. No requirements in Hawaii although many individual facilities have their own plans. Consortium does not have any requirements, and hasn't provided information except in general sense. Texas

has basic procedure for any disease with the amount of time to hold water before release changeable depending on the disease.

Recent emergency table top exercise was conducted in Maine for terrestrials. Exercises have focused on foot and mouth disease (FMD). Have been upgrading emergency plans since 2002 in State of Maine. Recent exercise included field component, and simulated taking samples at the farm. Private consulting firm set up the scenario, and gave new information as the scenario unfolded. People mobilized to keep the disease under control as soon as possible.

Preparations are also made for natural disasters in similar programs. A training team from North Carolina is helping other States develop programs. State Animal Response Teams (SARTs) and County Animal Response Teams (CARTs) are formed. Incident Command System (ICS) procedure and training are used. Opportunities exist in all States to be involved. Florida as a model for specific aquaculture response plan is available for other States. Plan was used in Florida after hurricanes to help determine needs, distribute equipment and supplies, share resources between agencies, etc.

Other comments:

Restocking – frequency of testing? How can one be sure facility or pond is clean? 2 years sufficient? If stocks are from certified source, 2 year period can be shortened. In Hawaii samples are taken more often in active targeted surveillance – may also be able to shorten the time according to OIE. But problem is in open systems that are not biosecure. Refer to the restoration section in OIE manual.

Gyrodactylus is listed in RAADs because it refers to the exotic salaris species.

Standardization of testing protocols is needed and should include evaluation of sample collection, sample processing, assay methodologies and sample size. Surveillance testing in shrimp is molecular based which is presently different from finfish surveillance testing. Since these molecular-based assays are more sensitive, testing in pools of 5 at statistically significant numbers is cost prohibitive. The effect of increasing sample pools on assay reliability and optimization, should be addressed to make testing protocols more cost effective and time efficient. If have line item funding in APHIS, the surveillance could be fully or partially funded.

Improvements in communications between natural resource and department of agriculture agencies within States are needed. The Plan needs to address this need.

Bob Durborow provided “Growout of Freshwater Prawns in Kentucky Ponds” booklets.

Workshop evaluation forms were completed by participants.

End of meeting.

Feedback from participants:

- Overall, high points were given for the workshop organization, effectiveness of facilitators, and meeting facilities.
- Most participants supported the concept of the working group and the amount of time devoted to the working group discussions.
- One suggestion was made to research what regulatory policies are in place in the U.S. presently, summarize, and present at future workshops.
- Suggestion was made to make sure industry is involved and informed even though ones invited to working group did not participate.